

II. Claim Amendments

Claims 1-11 (Cancelled)

12. (Currently Amended) A bipolar plate for fuel cells comprising:

a foil having a plurality of microstructures, said foil being at least partially conductive;

at least one channel structure[, being]] having a length scale that is an order of magnitude [[different]] larger than said microstructures, formed by said foil comprised of a plurality of channels wherein a substructure[, being]] having a length scale that is an order of magnitude [[different]] smaller than said microstructures, is superimposed above the microstructures, said substructure defining a fractal pattern with said microstructures;

whereby said channel structure selectively conveys a reactant; and

whereby said plurality of microstructures are integrated into said foil, enhancing rigidity of said foil.

13. (Previously Presented) The bipolar plate as recited in claim 12, wherein each of said plurality of microstructures is generally shaped as a polygon.

14. (Previously Presented) The bipolar plate as recited in claim 12, wherein said plurality of microstructures cover a surface of said foil.

15. (Previously Presented) The bipolar plate as recited in claim 12, wherein said plurality of microstructures are formed by one of an embossing and an etching process.

16. (Previously Presented) The bipolar plate as recited in claim 12, wherein said at least one channel structure is formed by one of an embossing and an etching process.

17. (Previously Presented) The bipolar plate as recited in claim 12, wherein each of said plurality of microstructures has a length generally between 1 micrometer (μm) and 500 micrometers (μm).

18. (Previously Presented) The bipolar plate as recited in claim 12, wherein said foil has a thickness of less than about 0.5 millimeters (mm).

19. (Previously Presented) The bipolar plate as recited in claim 12, wherein said channel structure forms a channel base, said channel base being shaped as a trough-like depression for draining away condensed reaction products.

20. (Previously Presented) The bipolar plate as recited in claim 12, wherein each of said microstructures including a recessed center forms a trough-like depression.

21. (Previously Presented) The bipolar plate as recited in claim 12, wherein said foil is hydrophobic.

22. (Previously Presented) The bipolar plate as recited in claim 12, wherein each of said microstructures includes at least one of said substructures.

23. (Previously Presented) The bipolar plate as recited in claim 22, wherein said substructure has a length generally between .1 micrometer (μm) and 50 micrometers (μm).

24. (Previously Presented) The bipolar plate as recited in claim 22, wherein said substructure includes a coating.

25. (Withdrawn) A method of forming a bipolar plate comprising the steps of:
forming a foil by one of an embossing and an etching process;
shaping a channel structure onto said foil;
integrating a plurality of microstructures in the form of polygons onto said foil;
conveying a reactant by said channel structure; and
enhancing rigidity of said foil by including said plurality of microstructures.

26. (Currently Amended) A bipolar plate for fuel cells comprising:
a foil having a plurality of microstructures formed onto a surface of said foil;
at least one channel structure[, being]] having a length scale that is an order of magnitude [[different]] larger than said microstructures, formed by said foil comprised of a plurality of channels wherein a substructure[, being]] having a length scale that is an order of magnitude [[different]] smaller than said microstructures, is superimposed above the microstructures, said substructure defining a fractal pattern with said microstructures;

whereby said channel structure selectively conveys a reactant to a proximate fuel cell; and

whereby said plurality of microstructures enhance rigidity of said foil.

27. (Currently Amended) The bipolar plate as recited in claim ~~[[25]]~~ 26, wherein each of said plurality of microstructures is generally shaped as a polygon.

28. (Currently Amended) The bipolar plate as recited in claim ~~[[25]]~~ 26, wherein said at least one channel structure is formed by one of an embossing and an etching process.